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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/020,217	12/18/2001	Paul A. Hoisington	09991-019001	5731

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EXAMINER

PEGGINS, KRISTAL J

ART UNIT PAPER NUMBER

2861

DATE MAILED: 10/21/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/020,217

Applicant(s)

HOISINGTON ET AL.

Examiner

K. Feggins

Art Unit

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HLW

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 July 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 13-47 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 13-47 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 12-16, 19-29 & 34-38, 41, 45 & 47 are rejected under 35 U.S.C. 102(e) as being anticipated by Kanaya et al. (US 6,217,158 B1, IDS).

Kanaya et al. disclose the following claimed limitations:

* regarding claims 12, 37 & 41, a method of depositing ink/apparatus disclose method/ (col 6, lines 28-29)

* delivering ink to an ink chamber (col 7, lines 27-32, col 8, lines 19-26, figs 8a, 8b);

* applying a jetting voltage across a first electrode/discrete electrodes, 4/ and a second electrode/discrete electrodes, 4/(also see fig 1a, 1b) on a face of a stiffened/curved/ piezoelectric element/vibrator unit/ to subject ink within the chamber to a jetting pressure, thereby depositing ink from an exit orifice (36 of fig 8a & 8b) of the ink chamber (23 of fig 8a & 8b) (col 4, lines 10-18, col 7, lines 27-40, 55-62, figs 6a & 6b)

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* regarding claims 13 & 37, wherein the stiffened/curved/ piezoelectric element/vibrator unit/ has a curved surface over the ink chamber (col 8, lines 20-24, figs 5-7, 8a & 8b)

* regarding claims 14, 37 & 41, wherein the curved surface/elastic plate, 1/ is concave relative to the ink chamber (col 8, lines 20-24, figs 8a & 8b),

*regarding claims 15, wherein the curved surface/curved portion, 2, of the elastic plate, 1 or 18/ has a substantially constant radius of curvature (col 8, lines 19-25, see figs 1a, 2d, 3e, 4d, 5-7, 8a & 8b),

* regarding claims 16, 23, 38 & 42, wherein the piezoelectric element/elastic plate/ includes lead zirconium titanate/PZT/(col 4, lines 1-5, 50-55).

*regarding claim 19, an ink jet printing module/an ink jet recording head with a piezoelectric vibrator unit/ (col 7, lines 63-64, figs 8a & 8b);

* an ink chamber/pressure generating ink chamber, 23/ (col 7, lines 32-40, figs 7b, 8a & 8b);

* a stiffened/curved/ piezoelectric element/vibrator unit/ having a region exposed to the ink chamber (figs 6a, 7a, 7b, 8a & 8b);

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* the piezoelectric element/vibrator unit/ being positioned over the ink chamber/pressure generating ink chamber, 23/ to subject ink within the chamber to jetting pressure (col 7, lines 33-54, figs 8a, 8b, 5-7, 9-14);

* electrical contacts/electrodes, 4/ arranged on a single surface of the piezoelectric element/vibrator unit/ for activation of the piezoelectric element (col 4, lines 10-18, col 7, lines 27-40, 55-62, figs 1a, 6a, 6b, 8a, 8b & 13).

* regarding claim 20, wherein the region of the stiffened/curved/ piezoelectric element/piezoelectric vibrator unit/ exposed to the ink chamber has a curved surface (col 8, lines 19-25, see figs 7a, 7b, 8a, 8b, item 2)

* regarding claim 21, wherein the curved surface is concave/outwardly curved/ relative to the ink chamber(see fig 8a, 8b)

* regarding claim 22, wherein the curved surface has a substantially constant radius of curvature (see fig 1a, shows the curves of the elastic plate to be substantially the same; the curved portion are a part of the elastic plate (col 4, lines 6-9)

* regarding claims 24 & 44, wherein the piezoelectric element has a thickness of 5 to 300 microns/5 μ or larger/ (col 6, lines 42-46).

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* regarding claims 25 & 43, wherein the piezoelectric element has a thickness of 10 to 250 microns/5 μ or larger/ (col 6, lines 42-46).

* regarding claims 26 & 45, wherein the piezoelectric element has a thickness of less than 100 microns/5 μ or larger/ (col 6, lines 42-46).

* regarding claim 27, wherein the chamber has a width of less than 1200/150/ microns (col 6, lines 32-39).

* regarding claims 28 & 47, wherein the chamber has a width of 50 to 1000/150 to 210/ microns (col 6, lines 32-39).

* regarding claim 29, wherein the chamber has a width of 100 to 800/150 to 210/ microns (col 6, lines 32-39).

* regarding claim 34, a series of chambers (col 11, lines 24-26, figs 21, item 23).

* regarding claim 35, wherein each of the chambers/23/ is covered by a single piezoelectric element/piezoelectric vibrator unit, 5/ (col 4, line 1-2, col 11, lines 60-65 figs 1a, 6, 7a, 7b, 8a, 8b, 21)

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* regarding claim 36, wherein the chamber includes a wall contacting the piezoelectric element/piezoelectric vibrator unit/ exposed to the ink chamber at an angle of greater than ninety degrees (col 7, lines 63-65, col 8, lines 19-23, see fig 8b)

* regarding claim 41, electrical contacts are arranged on a surface of the piezoelectric element distal to the ink chamber for activation of the piezoelectric element (col 4, lines 10-18, col 7, lines 27-40, 55-62, figs 1a, 6a, 6b, 8a, 8b & 13).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title; if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 18 & 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kanaya et al. (US 6,217,158 B1, IDS) in view of Watanabe et al. (US 6361154 B1).

Kanaya et al. disclose all of the claimed limitations except for the following:

* a curved surface that has a radius of curvature of less than 5 millimeters

Watanabe et al. discloses the following claimed limitation:

* a curved surface that has a radius of curvature of less than 5 millimeters (col 3, lines 61-64, col 6, lines 34-35, figs 1-2, 5) for the purpose of improving the productivity as far as possible by suppressing the occurrence of cracks and the like in the vibration plate and the piezoelectric devices.

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It would have been obvious at the time of the invention was made to a person having ordinary skill in the art to utilize a curved surface that has a radius of curvature of less than 5 millimeters, taught by Watanabe et al. into Kanaya et al. for the purpose of improving the productivity as far as possible by suppressing the occurrence of cracks and the like in the vibration plate and the piezoelectric devices.

5. Claims 17, 30-33, 39 & 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kanaya et al. (US 6,217,158 B1, IDS) in view of Yamamuro et al. (US 4,700,203).

Kanaya et al. disclose the following:

- * low drive voltage (col 8, lines 66-67)

Kanaya et al. does not disclose the following claimed limitations:

- * wherein the jetting voltage is less than 60 volts
- * wherein the curved surface has a radius of curvature of 500 to 3000 microns.,
- * wherein the curved surface has a radius of curvature of 1000 to 2800 microns
- * wherein the curved surface has a radius of curvature of 1500 to 2600 microns
- * wherein the electrodes/conductive or electrode layer, 84/ are configured to apply a voltage of less than 60 volts

Yamamuro et al. disclose the following claimed limitation:

* regarding claims 17 & 39, wherein the jetting voltage is less than 60 volts/50 volts/ (col 5, line 43) for the purpose of providing an ink jet head which is operable on relatively low voltages.

* regarding claims 30 & 46, wherein the curved surface has a radius of curvature of 500 to 3000 microns/10.7 to 42.7mm/ (col 5, lines 43-55, Table 1) for the purpose of providing an ink jet head capable of compressing ink to eject a drop of ink.

* regarding claim 31, wherein the curved surface has a radius of curvature of 1000 to 2800 microns/10.7 to 42.7mm/ (col 5, lines 43-55, Table 1) for the purpose of providing an improved ink jet head.

* regarding claim 32, wherein the curved surface has a radius of curvature of 1500 to 2600 microns/10.7 to 42.7mm/ (col 5, lines 43-55, Table 1) for the purpose of providing an ink jet head which allows a minimum of load to act on the substrate adapted to support the ink support means.

* regarding claim 33, wherein the electrodes/conductive or electrode layer, 84/ are configured to apply a voltage of less than 60 volts/50 volts/ (col 5, lines 43, 49, 66-68) for the purpose of providing an ink jet head which has little least susceptibility to dielectric breakdown.

It would have been obvious at the time of the invention was made to a person having ordinary skill in the art to utilize a jetting voltage is less than 60 volts; a curved surface that has a radius of curvature of 500 to 3000 microns; a curved surface that has a radius of curvature of 1000 to 2800 microns; a curved surface that has a radius of curvature of 1500 to 2600 microns; and electrodes are configured to apply a voltage of less than 60 volts, taught by Yamamuro et al. into Kanaya et al. for the purposes of providing an ink jet head which is operable on relatively low voltages, providing an ink jet head capable of compressing ink to eject a drop of ink, providing an improved ink jet head, providing an ink jet head which allows a minimum of load to act on the substrate adapted to support the ink support means and providing an ink jet head which has little least susceptibility to dielectric breakdown.

Response to Arguments

6. Applicant's arguments filed July 10, 2003 have been fully considered but they are not persuasive.

In response to Applicant's arguments that Kanaya et al. does not disclose electrical contacts arranged on a single surface of the piezoelectric element for activation of the piezoelectric element is acknowledged. However, Kanaya et al. does disclose an electrical contacts arranged on the surface of the piezoelectric element, elastic plate. The piezoelectric element is of one layer/surface/part/plate, thereby having one surface or a single surface. Kanaya et al. does disclose more than one point of activation of the piezoelectric, however these points are still on the same single/one surface.

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Conclusion

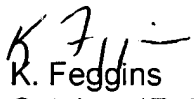
7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Kitahara et al. (US 5,856,837) disclose an ink jet head with a convex vibrating plate. Motoba et al. (US 5,684,519) disclose an ink jet where the center portion of the ink discharge plate is deformed towards the nozzle.

Communication With The USPTO

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to K. Feggins whose telephone number is 703-306-4548. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, B. Fuller can be reached on 703-308-0079. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.


K. Feggins
October 17, 2003